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mosses. Inasmuch as the diagnostic characters of the species are drawn chiefly from the author's experience, every student of mosses may find the book not only convenient for the ready determination of miscellaneous collections, but even helpful in discriminating critical species. Half of the first part is devoted to directions for collecting, preserving, mounting, methods of manipulation, an account of life history and structure, and an illustrated glossary of bryological terms. The beginning of the manual proper occupies the remainder, with descriptions of Sphagnaceae, Andreaeaceae, Georgiaceae, Polytrichaceae, Buxbaumiaceae, Fissidentaceae, and Dicranaceae. The descriptions of families are rather full, the classification following closely Jameson's *Handbook of British Mosses*, and they are accompanied by numerous illustrations of the characteristic structures. Many of the plates are reproduced from the *Bryologia Europaea*, some from Sullivant's *Icones Muscorum*, while a goodly number of illustrations are original. The book deserves hearty welcome from teachers and students.—CHARLES J. CHAMBERLAIN.

NOTES FOR STUDENTS.

ATTENTION SHOULD BE CALLED to an important article by F. Cavers[10] on asexual reproduction and regeneration in Hepaticae. The paper supplements the extensive work of Correns on similar phenomena in the mosses.—C. R. B.

MR. W. C. W[ORSDELL] writes a historical sketch[11] of the phenomenon of "double fertilization" in angiosperms in which most of the literature of the subject is mentioned except the work of American students, and this is conspicuous by its absence.—C. R. B.

DR. EMERICH ZEDERBAUER holds[12] that two of the Myxobacteriaceae described by Thaxter, *Myxococcus incrustans* and *Chondromyces glomeratus*, and probably all members of the group, are compound organisms, like lichens, a true fungus on the one hand in symbiosis with a bacterium on the other. He has grown each component separately in pure cultures and studied their characteristics.—C. R. B.

M. PH. EBERHARDT has made an extended study of the influence of dry air and humid air upon the form and structure of plants.[13] The work was carried on at the botanical laboratory of the Sorbonne and the experimental grounds at Fontainebleau. Plants growing in the ground were covered with bell jars of adequate size, proper arrangements being made for ventilation and for maintaining the moistness or dryness of the air at will. Although the paper contributes few entirely new facts, it brings experimental evidence to bear upon conclusions already drawn from comparative observations.— C. R. B.

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[10] CAVERS, F., Asexual reproduction in Hepaticae. New Phytologist **2**:112–133, 155–165. *figs. 8.* 1903,

[11] W[ORSDELL], W. C., The phenomenon of "double fertilization" in angiosperms; an historical sketch. New Phytologist **2**:145–155. 1903.

[12] ZEDERBAUER, EMERICH, Myxobacteriaceae eine Symbiose zwischen Pilze und Bacterien. Oesterr. Bot. Zeits. **53**:309. 1903.

[13] EBERHARDT, PH., Influence de l'air sec et de l'air humide sur la forme et sur la structure des végétaux. Ann. Sci. Nat. Bot. VIII. **18**:61–153. *pl. 1.* 1903.

SCHIFFNER'S studies[14] of Gymnomitrium and Marsupella may be summarized in the following synonymy: MARSUPELLA SPRUCEI (Limpr.) Bern. *stat.* MARSUPELLA USTULATA Spruce (*Sarcoscyphus Sprucei decipiens* Limpr.; *Nardia gracilis* Mass. & Car.). GYMNOMITRIUM ADUSTUM Nees (*Marsupella olivacea* Spruce; *Acolea brevissima* Dum. inadmiss.). MARSUPELLA CONDENSATA (Angstr.) Kaal. (*Gymnomitrium condensatum* Angstr., *non* Limpr.; *Sarcoscyphus aemulus* Limpr., *et auct.*) MARSUPELLA (*Hyalacme*) APICULATA Schiffn. (*Gymnomitrium condensatum* Limpr. *et auct.*, *non* Angstr.). GYMNOMITRIUM ALPINUM (Gott.) Schiffn. (*Sarcoscyphus alpinus* Gott.)

BY USING MODERN METHODS in an investigation of the development of the antheridial "flower" of Polytrichum and Mnium, Vaupel seems to have settled the Hofmeister-Leitgeb-Goebel controversy as to its morphology.[15] In Mnium each cluster of antheridia in the "compound male flower" (*i. e.*, each twig of the branch system) corresponds to the antheridial group of Funaria, in that the first antheridium develops from the apical cell, the rest arising at various points. Leaf formation in the center of the "flower," however, is suppressed, all the segments forming antheridia. But in Polytrichum the apical cells of the twigs do not produce antheridia, persisting even until rudiments of the last antheridia appear. Thus again the truth lies between the contestants. Vaupel also ascertained that the brown substance in certain cells of the paraphyses of *Mnium cuspidatum* and *Polytrichum juniperinum* prevents the absorption of water by the stems, leaving it all to the antheridia; that the opening of the antheridia of Marchantia is due to the swelling of the mucilage laid down in the wall cells; and that the rhizoid strands of Polytrichum are primarily water conductors.—C. R. B.

RESPIRATION.—Further researches on the influence of injuries upon the respiratory quotient have been made by Maximow,[16] who corrects some of Richards's results, confirms others, and concludes that (1) the variations are due partly to the capacity of fleshy organs to retain for a time considerable amounts of CO_2 and to eliminate it later in excess; (2) when injured the early increase of CO_2 (which soon ceases) is due to the exposure of additional free surface; (3) the value of the respiratory quotient then falls rapidly, sometimes as low as 0.5, reaching a minimum before respiratory activity attains its maximum, which it does on the second or third day; (4) with healing, normal conditions again gradually prevail.

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[14] SCHIFFNER, VICTOR, Studien über kritische Arten der Gattung Gymnomitrium und Marsupella. Oesterr. Bot. Zeits. **53**:95–99, 166–172, 185–194, 246–252, 280–284. *pls. 2–4.* 1903.

[15] VAUPEL, F., Beiträge zur Kenntniss einiger Bryophyten. Flora **92**:346–370. 1903.

[16] MAXIMOW, N. A., Ueber den Einfluss der Verletzungen auf die Respirationsquotient. Ber. Deutsch. Bot. Gesells. **21**:252–259. 1903.

NABOKICH confirms[17] earlier results of Polowzoff[18] that a considerable part (25–50 per cent. of the CO_2 usually ascribed to the respiration of seeds in experiments is really due to the respiration of microorganisms, as shown by a comparison of the respiration of sterile and infected seeds. He also ascertained that the antiseptics used (bromin and corrosive sublimate) did not depress the respiration of the seeds, but clearly accelerated it.—C. R. B.

[17] NABOKICH, A. J., Ueber den Einfluss der Sterilisation der Samen auf die Athmung. Ber. Deutsch. Gesells. **21**: 279–291. 1903.

[18] POLOWZOFF, W. W., Untersuchungen über die Athmung der Pflanzen. Ber. Kaiserl. Akad. Wiss. VIII. **12**: 14–16. 1903.